RESEARCH HIGHLIGHTS

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INCOMPATIBLE BUILDING MATERIALS

Introduction

Many types of building materials are needed to construct a house. Occasionally, one material can have a detrimental effect on an adjacent material resulting in premature material degradation. Builders, renovators and building designers need to be aware of this incompatibility issue and better understand how to determine if materials are compatible. Because there is no central registry for recording and sharing incompatibility problems, Canada Mortgage and Housing Corporation and the Canadian Home Builders' Association initiated this research project to help practitioners in the home construction industry to become and remain aware of material incompatibility situations.

Purpose

The purpose of this research project is to document building material incompatibilities so that lessons learned in the field can be shared. Increased awareness of building material incompatibilities will reduce construction defects to the benefit of builders, designers and homeowners.

Methodology

Advisory Committee

An Advisory Committee comprised of industry practitioners, and building science and material experts was formed to define the project scope and direction, identify sources of information, and to provide assistance for getting the report information to building professionals and practitioners.

Research

Reports of building material incompatibilities were sought by researching building and material sources of information. The search included the Internet, builder periodicals, and scientific library databases. The literature research generated 10 cases of the 35 incompatibility cases that were incorporated into the final report.

Survey

A survey form was sent to architects, builders, renovators, building officials, industry associations, and selected individuals to obtain reports of building material incompatibility. Respondents were asked

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to describe the problem and, where possible, a solution to the problem. The survey generated 25 of the 35 cases that were incorporated into the final report. (Many other responses were not included in the report because they were either duplicates or did not meet the project criteria for incompatibility.)

Verification

The literature search cases and the survey responses were screened for suitability. The results of the screening were submitted to the Advisory Committee for approval. Prior to inclusion in the final report, cases were confirmed by a) published information or b) by one or more technical experts including manufacturers' representatives.

Report

The Commentary section of the report explains the type of problem, the timeframe it takes for the problem to become apparent, and as much as possible, an explanation of why the materials are not compatible, the reporting source and the solution. The report uses the Masterformat numbering system. In some cases, a General Information section was included when it was deemed beneficial to explain general principles or properties. For example, dissimilar metals are known to be problematic, especially when moisture is present. Because there are perhaps 20 to 30 metals that can find their way into residential construction, the General Information explains the combination of metals can be satisfactory or unsatisfactory depending on how far apart they are on the Noble table.

Communication Plan

A technology transfer plan was developed to provide the report to individuals and organizations that assisted with survey responses or technical review. In the longer term, the report might be available on the Internet and provide a mechanism for adding additional examples of material incompatibility as they arise.

Trend Analysis

A review of the report shows that sealants and metals are two groups of materials that had several incompatibility reports. In the case of metals, the science of dissimilar metals is very advanced but builders may not be aware of this body of information. In the case of sealants, there is an overwhelming number of products to suit a wide range of applications, and there is no simple and universal product labelling system to help avoid improper selections. In both cases, the General Information sections in the reports should improve the level of understanding of properties, applications and limitations for these materials.

Other cases result from jobsite-imposed conditions or deadlines. For example, the rush to apply paint in unheated conditions as winter approaches often ignores the temperature application ranges recommended on a product. While ignoring the product limits may get the project completed in time, it also brings a fairly high likelihood of recalls at a later date, often at higher cost than doing the work according to instructions in the first place.

Conclusions

The Incompatible Building Materials report is a first attempt at identifying and recording cases of incompatibility. The report contains 35 examples of incompatibility cases that building professionals and construction industry practitioners should be aware of, in addition to the myriad of building performance issues that result from climatic and building environment factors.

This Research Highlight also includes a survey form that building professionals can use to report additional cases of incompatibility.

Survey Form A copy of the survey form used for the project is included to solicit additional cases of building material incompatibility.

INCOMPATIBLE BUILDING MATERIALS

In 2003, the Canada Mortgage and Housing Corporation completed a report titled "Incompatible Building Materials" to document cases of building material incompatibility reported by builders, renovators, inspectors and architects. The report is intended to initiate shared learning so that others can avoid problems.

The report is a start to the identification of building materials incompatibility. You can help by adding your knowledge and experience to future editions of the report by completing and returning the survey form below.

Typical documented examples of incompatibilities

Framing materials

- Fasteners affected by cedar, redwood and treated wood products in wet locations

Wet materials: sealants, adhesives and coatings

- Solvent-based sealants, adhesives and damp-proofing affecting polystyrene rigid insulation
- Silicone sealant affecting paintability and recaulking

General

- Metals affecting metals - dissimilar metals
- Copper tubing affected by aggressive (acidic soils)

Your example

Your name: _____ **Tel:** (___)_____ **Email**: _____

Problem (symptoms, causes, conditions, time-frame etc.): _____

_____

_____

_____

_____

_____

_____

Solution (if there is one): _____

_____

_____

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Housing Research at CMHC

Under Part IX of the *National Housing Act*, the Government of Canada provides funds to CMHC to conduct research into the social, economic and technical aspects of housing and related fields, and to undertake the publishing and distribution of the results of this research.

This fact sheet is one of a series intended to inform you of the nature and scope of CMHC's research.

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